

# The Ford Green Roof 10 Years and Growing Strong

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Ford Motor Company

# Overview

- Vision
- Sustainable Considerations
- Design
- Installation
- Study Results
- Maintenance Requirements



*Ford Motor Company*  
100 YEARS

# Leadership



- Good companies deliver excellent products and service. Great ones deliver excellent products and service and strive to make the world a better place.

# Accountability



- Corporate environmental performance more than ever is being measured and judged.
- Improving social performance, reducing our environmental footprint and contributing to strong local, national, and global economies benefits everyone.

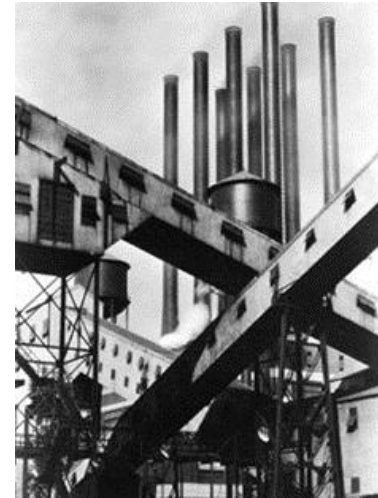
# Responsibility

- Meeting regulatory requirements represents a minimum.
- Adhering to global, voluntary standards further protect our employees, customers, other stakeholders, and our reputation.





# *Ford Rouge Heritage Program Sustainability Initiatives*







**The revitalization of the Rouge project is a terrific opportunity to demonstrate sustainability by transforming the icon of 20th century industrial manufacturing into the model of a 21st century sustainable manufacturing center. It will also be a very visible testament to Ford's commitment to environmental leadership and social responsibility.**

**William Clay Ford, Jr.  
Greenfield Village, May 3, 1999**

# Four Interacting Perspectives

- Regulatory – Storm Water/TMDL Drivers
- Sustainable Development
- Industrial Redevelopment Site
- On-Going Business Operation



# Current Site Considerations

- Facility Protection
  - Prevent flooding of facilities during a 100-year storm event
- Minimize Ecological Impacts of Development
  - Natural watershed emulation for water quality and hydrology
  - Exceed regulatory requirements
- Industrial Site Constraints
  - Avoid excavation and infiltration
- Cost-Effective Implementation
  - Develop sustainable strategies that minimize installation and operation costs

# Innovative Concepts and New Tools for Stormwater Management

- Vegetated roof provides hydraulic buffering and runoff volume reduction
- Storage-dominated system lowers cost of conveyance piping and treatment units by decreasing peak flows more than ten-fold;
- Constant-discharge weir controls the linkage between porous storage and stormwater treatment wetlands (patentable elements);
- Treatment wetlands provide the ability to reach aggressive water quality improvement goals;
- Use of sustainable practices is maximized.

# Phase I Design Elements

## Main Phase I treatment system

Treatment wetlands

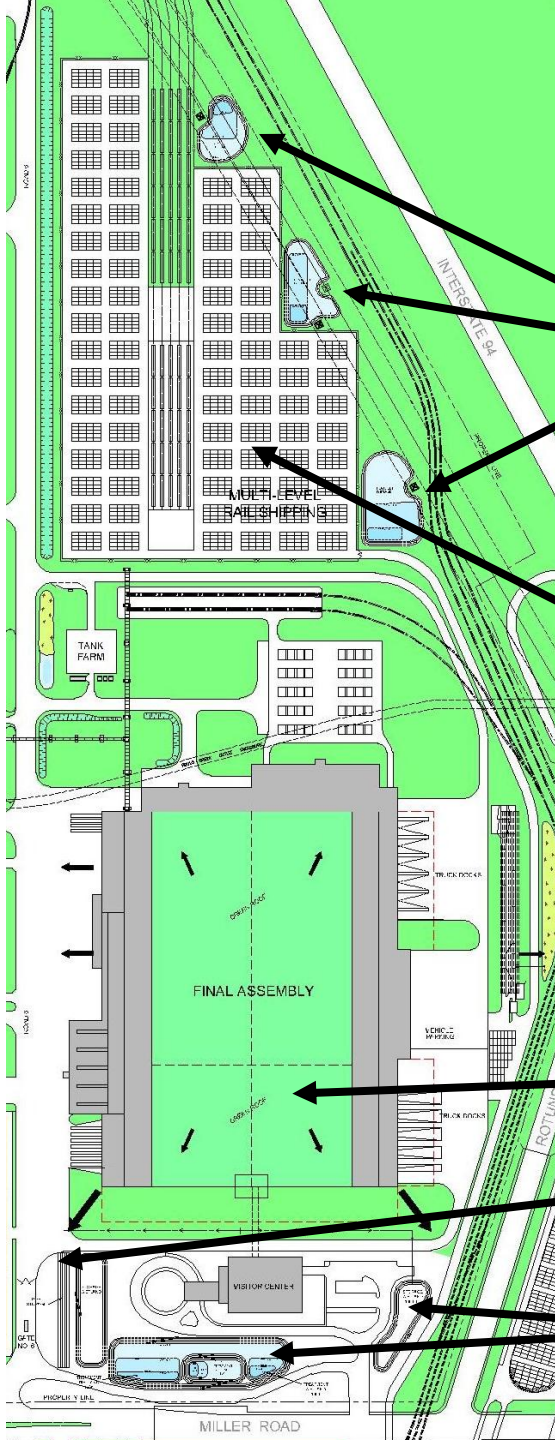
Central storage - porous bed  
underlying product lot

## Stormwater treatment demonstration area

Vegetated roof

Tubular underground storage

Storage and treatment wetland complex





# Green Roof Advantages



- Integral to Storm water Management program
  - Stormwater runoff volume reduction
  - Total Suspended Solids (TSS) reduction
- Extends Roof Life
- Cools Building Interior in Summer
- Insulates Building Interior in Winter
- Provides Habitat for Birds and Insects
- Oxygen / Carbon Dioxide Exchange
- Urban Heat Island Effect
- Aesthetics
- LEED – USGBC
- Noise Reduction

# Design Considerations

- Additional Structural loading.
  - Intensive 25 to 250psf
  - Extensive 10 to 25psf
- Roof Membrane/Water Proofing
  - Liquid waterproofing
  - Built up or Modified Bituminous
  - PVC / Thermoplastics single ply
  - TPO/ FPO single ply

# Design Considerations

- Green Roof System
  - Root Barrier
  - Drainage layer
  - Water absorption layer
  - Growing medium
  - Plant material
- Irrigation

# Key Ford Roof Requirements

- Light Weight
- Ease of Installation
- Instant Green Roof with Full Grown Plants
- Proven Performance
- Minimal Long-Term Maintenance

**Xero Flor System Selected**



# Why Xero Flor?

- Lightweight system – less than 11 lbs/sq ft
- Thin substrate layer minimizes weed growth
- System can be grown at ground level and transported to the roof like sod







# Nesting Killdeer









# Study Results

- 2010 Plant Coverage Study
  - 13 of 15 original species thriving
  - 93 to 98 percent coverage of hearty vegetation
- 2009 Roof Structure Study
  - Vegetated portion showed no leaks
  - Roof membrane under vegetated cover showed less deterioration than conventional roof sections
- 2005 Water Study
  - Retains over 40% of storm water runoff as compared to the conventional roof sections
  - Overall system reduces TSS by 85%
  - Emulates natural watershed











# The Next Industrial Revolution Begins



"This is not environmental philanthropy; It is sound business, which, for the first time, balances the business needs of auto manufacturing with ecological and social concerns in the redesign of a brownfield site"